DAVID HEURTEL-DEPEIGES

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EDUCATION

2024-Curr.	**MILA – Quebec AI Institute / Polytechnique Montreal:** PhD in Computer Science under the supervision of Sarath Chandar. Research Interests: AI for Science, Safe foundation models, (Robust) alignment.
2023-2024	**MVA, Ecole Normale Supérieure Paris-Saclay:** France's foremost master's degree in Machine Learning and Artificial Intelligence. Relevant coursework includes: *AGI and AGI safety, NLP and Graph ML, Robotics, Computational Statistics, Probabilistic Graphical Modelling, Reinforcement Learning, Generative Modelling, Image Reconstruction, Bayesian ML.*
2020-2023	**Ecole Polytechnique, Palaiseau:** France's leading university for science and engineering. Major in applied math and computer science. Relevant coursework includes: *Statistics*, *Algorithm design*, *Monte Carlo methods*, *Foundations of machine learning*, *Topological data analysis*, *Deep Learning.* GPA: 3.93
2018-2020	**Lycée Sainte-Geneviève, Preparatory Program:** a two-year post-secondary program in advanced math and physics with a computer science minor, leading to nationwide competitive exams to the Grandes Ecoles. Admitted to ENS Ulm and Polytechnique. Relevant coursework includes: *General and Linear Algebra*, *Topology and Calculus*, *Probability Theory*, *Algorithm Design and Analysis*. GPA: 3.99

WORK EXPERIENCE

Apr-Aug 2024	**Google DeepMind, London. Student Researcher**, in the Universal AI Team, under the supervision of Anian Ruoss: - Training and evaluation of transformers on multimodal bytes sequences - Exploration of trade-offs with a lossless compression angle (model size, context size) - Side project on lossy video compression.
Apr-Aug 2023	**Research Internship, Center for Computational Mathematics, Flatiron Institute, NY,** under the supervision of Bruno Regaldo-Saint Blancard and Ruben Ohana: - Introduced a new kind of diffusion models under colored noise, enabling component separations in cosmology as well as general denoising of scientific and natural images. - Integrated tools for Bayesian inference with our generative prior. D. Heurtel-Depeiges et al. **Removing Dust from CMB Observations with Diffusion Models**, accepted as **Oral at NeurIPS 2023 MLPS workshop**. D. Heurtel-Depeiges et al. **Listening to the Noise: Blind Denoising with Gibbs Diffusion**, accepted at **ICML 2024**.
June 2022- August 2022	**Birdz (Veolia),** *Data-scientist intern for water quality***:** Team under the supervision of Guillaume Perrin-Fabre: - Developed an app to predict algae concentration in freshwater using Python, SQL, and Docker. Created the documentation. - Deployed and tested the app on Google Cloud Platform, optimizing its performance. Developed tests for quantifying model accuracy.

| 2021-2022 | **Lycée Sainte-Geneviève, Oral examiner in physics and substitute in maths** |
| 2020-2021 | **French Department of Defense, Officer cadet** |

SELECTED RESEARCH AND PROJECT WORK

Feb 2024– Curr	**Research Project – ENS Paris Saclay:** Sequential Monte Carlo Diffusion sampler for blind image reconstruction.
Nov 2023 – Feb 2024	**Research Project – Ecole Polytechnique:** CLIP embedding of graph representation of molecules and their text descriptions for query answering.
Oct 2023 – Dec 2023	**Research Project – ENS Paris Saclay:** Mechanistic interpretability in Vision Models.
Oct 2023 – Dec 2023	**Research Project – ENS Paris Saclay (prof. at INRIA):** Investigating catastrophic forgetting in Dreamer-type models in RL.
Jan– Mar 2023	**Research Project – Center for Applied Mathematics (CMAP):** techniques for speeding up diffusion models training and inference: cascaded diffusion models, transfer learning and fine-tuning under the supervision of Marc Lelarge
2021– 2022	**Research Project – CMAP:** in collaboration with the University of Corsica, wildfire forecasting and uncertainty quantification.
Sep – Dec 2022	**Experimental Project – CMAP:** Statistical Learning seminar under the supervision of Erwan Scornet**,** topics on empirical risk minimization theory and non-parametric estimation tools. Paper presentation, generalization and simplification of proofs, simulation to evaluate papers claims and bounds.
2017-2018	**Research Project & Competition – TFJM2:** French equivalent of the ITYM, research on 8 open problems whose formulation is adapted to high-school students. Placed 3rd in the Greater Paris Metropolitan Area

RELEVANT SKILLS

- Programming. **Python** (**PyTorch**, **JAX**, Pandas…), SQL
- Distributed and accelerated computing on a cluster (data parallelism, model sharding, job management in slurm)

- Language: English (both in professional and informal settings, TOEFL iBT: 110, GRE: 167 verbal, 170 quantitative), German (intermediate), French (native)

EXTRACURRICULAR ACTIVITIES

Students' Union cultural representative (2018 – 2020): organizing concerts, conferences, clubs, and remembrance ceremonies for the Armistice Day Centenary 2018-2020.

Project Manager at X-Armées (2021 - 2022): reaching out to units in the French military to provide technical support and R&D opportunities.

Parismaths volunteer teacher (2023): Arithmetic

Miscellaneous: First aid certificate, Highest level of qualification in sailing nationwide. Singing in Polytechnique choir (4 to 5 productions a year) 11 years of piano.

HONORS AND ACHIEVEMENTS

2017	Placed 4th in the French **Math Olympiads in the Greater Paris Metropolitan Area**
2018	**General Academic Contest Mathematics**: *Accessit* (honorable mention)
2018-2019	**International Physics Olympiad**. Among the 20 shortlisted candidates for Team France.